fourth ventricle with the central canal of the spinal cord, syringostomy with syringosubarachnoid shunting, terminal ventriculostomy, ventriculoperitoneal or ventriculoatrial shunting and syringoperitoneal shunting. The choice of procedure is based on the suspected cause of the syringomyelia and the anatomic data obtained by MR imaging.

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Surgical Therapy for Medically Intractable Epilepsy in Children

THE RENEWAL OF INTEREST in the surgical treatment of medically intractable epilepsy is well illustrated by the occurrence of two international conferences devoted to the subject in the past six months, after more than a dozen years without one. This renewed interest extends to the use of surgical approaches in children with difficult seizure problems. Cortical resection is the surgical approach most likely to completely control seizures. The indications for cortical resection in children in their early teens (and perhaps even younger) are the same as for adults: medical intractability, the presence of a focus of seizure onset and evidence that the focus is not in a brain area essential for motor, speech or memory function. Most of these patients will have temporal lobe epileptic foci. Medical intractability means a persistence of seizures after trials of the major antiepileptic drugs at therapeutic serum concentrations: phenytoin and carbamazepine alone and together for complex partial seizures of temporal lobe origin. Most patients who achieve seizure control on antiepileptic drug therapy do so within six months of reaching therapeutic drug concentrations. Children in their early teens with partial complex temporal lobe seizures seldom outgrow them; waiting for this to occur, therefore, is not a reason to defer surgical treatment. The more satisfactory rehabilitation that follows seizure control in the teens rather than the 20s is a reason to consider earlier surgical intervention.

Papers given at recent conferences indicated that no one diagnostic approach is suitable to identify a focus in all patients. In one subset of candidates who are particularly likely to have their seizures controlled by a surgical resection, the focus can be identified by noninvasive means without the use of depth electrodes or other techniques of ongoing direct brain recording. The exact noninvasive criteria used by various centers differ but often include localized interictal epileptiform abnormalities on scalp electroencephalography (EEG), evidence of fast motor responses and a lack of psychopathology on neuropsychological testing or measures of focal functional deficit, especially evidence of localized glucose hypometabolism on positron emission tomography. On the other hand, ongoing direct brain recording techniques have been of value in other patients who do not meet these noninvasive criteria due to bilateral, especially bitemporal, epileptiform abnormalities. In a large proportion of those patients, direct brain recording, coupled with intensive video and EEG monitoring, has shown that most or all major, socially disabling seizures arise from one temporal lobe. Surgical resection of that temporal lobe has a reasonable chance of controlling major seizures. A wide variety of ongoing direct brain recording techniques are currently in use, including stereotaxically implanted depth electrodes, subdural strips and tubes and subdural or epidural plates of electrodes. The advantages of each approach are still being determined.

The hemisphere containing the epileptic focus for language and memory is usually determined preoperatively by intracarotid perfusion of amobarbital (Wada test), a procedure that can be used in children as young as 6 years. If the focus is in the dominant hemisphere, the areas essential for language are localized by electrical stimulation mapping and these areas spared in the resection. The intraoperative use of this approach, however, requires the use of local anesthesia that children in the early teens, and perhaps younger, will tolerate. The use of epidural or subdural plates of electrodes provides an alternative technique to obtain the same localization information in children who cannot tolerate a procedure under local anesthesia. Resections can also be carried out in a temporal lobe essential for memory, but this requires sparing both hippocampus and lateral temporal memory areas as identified by electrical stimulation mapping. With the use of these techniques, the risk to language and memory is sufficiently low that having the epileptic focus in the dominant hemisphere is not a reason for deferring resection.

The decision to undertake a surgical resection should be made based on the impact to a child of the control of seizures alone. Behavioral problems do not reliably improve after an operation for seizure control, and this goal is not by itself an indication for surgical therapy for seizures.

Surgical therapy may also be of value in several special situations. In very young children, surgical therapy is usually reserved for intractable seizures with a clear focal onset; a substantial number of these children will have the distinctive pathologic changes of Rasmussen's encephalitis. Children with the infantile hemiplegia syndrome have a high probability of seizure control after hemispherectomy. Recent modifications in the technique of this operation seem to have reduced the long-term complication of bleeding into the resection site and the subsequent development of a communicating hydrocephalus. The value of sectioning the corpus callosum in the treatment of seizures is still being debated. There is a developing consensus, however, that it may have some value in patients with frequent major motor convulsive (grand mal) seizures without a focus and in frequent drop seizures where the patient is likely to sustain injury.

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